AUSTRALIAN ENERGY COUNCIL

SOLAR REPORT

QUARTER 2, 2021

Australian Energy Council

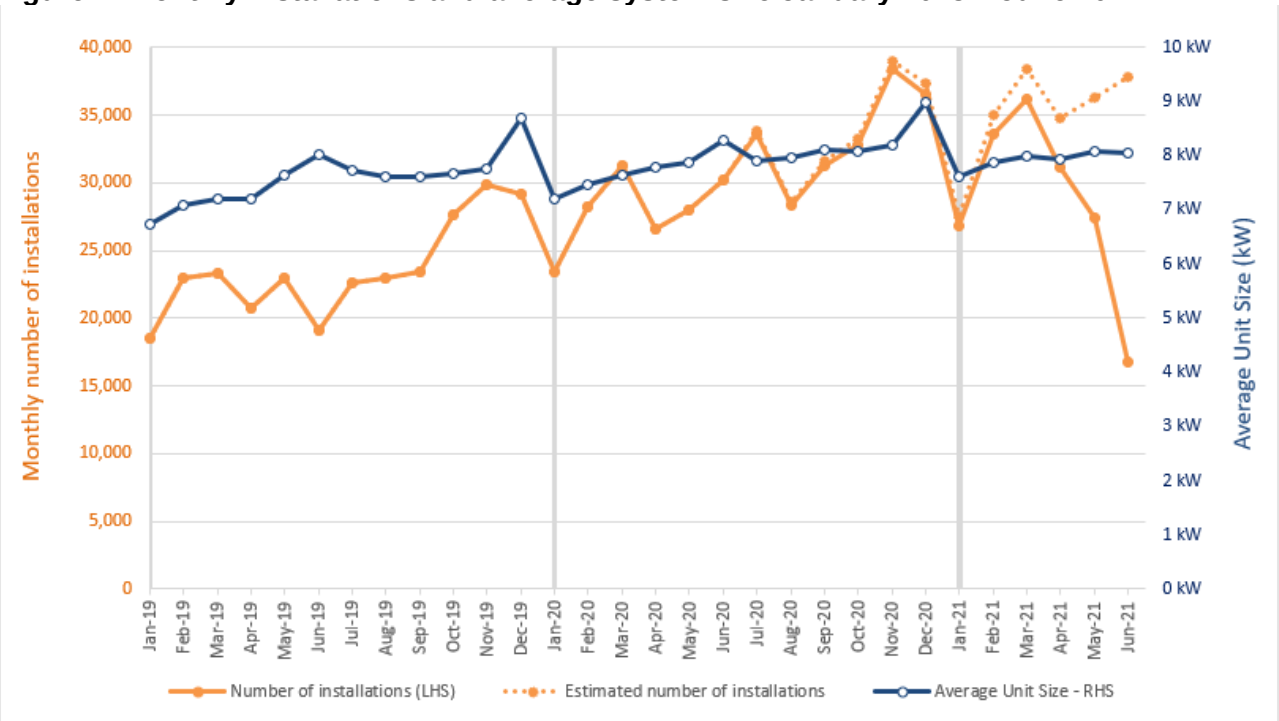
Table of contents

SECTION I: STATE OF SOLAR IN AUSTRALIA

At 30 June 2021, the total installed capacity of rooftop solar PV in Australia is close to exceeding 14.7 GW, representing more than 2.86 million solar system installations (according to latest data from the Clean Energy Regulator (CER) – 29 July 2021). However due to a 12-month lag in reporting[i], it is anticipated that the number of new monthly installations will continue to increase.

Figure 1 shows the growth in installations and total installed capacity, along with the average monthly system size installed across Australia. An estimated 109,000 small-scale solar PV systems have been installed in the second quarter of 2021 with an average unit size reaching 8.06 kW in June. Peak system size was recorded in December 2020 at 9kW.

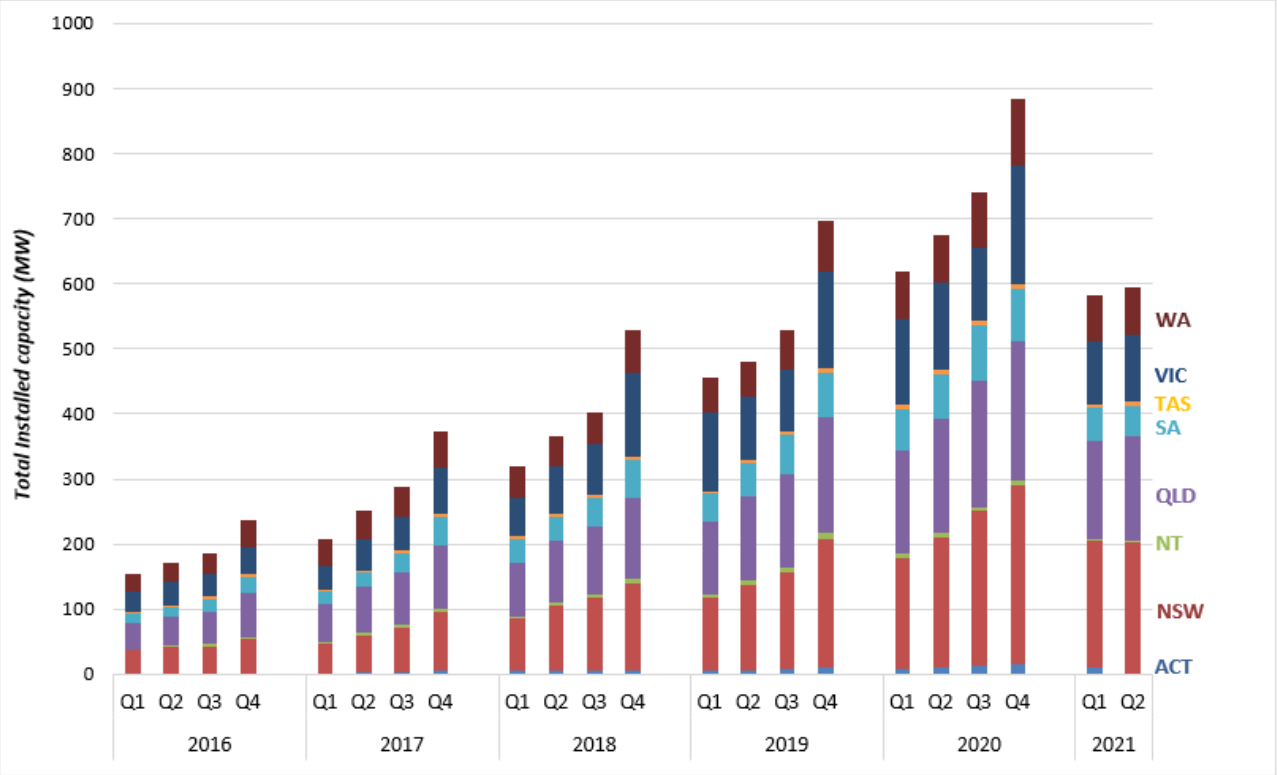
Figure 1: Monthly installations and average system size January 2013 – June 2021



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

Figure 2 shows the total installed capacity of solar systems by quarter. Jurisdictions in the National Electricity Market (NEM)[ii] account for 88 per cent of the total capacity installed in Australia in the second quarter of 2021. New South Wales and Queensland make up 51 per cent of the nation's total quarterly installed capacity.

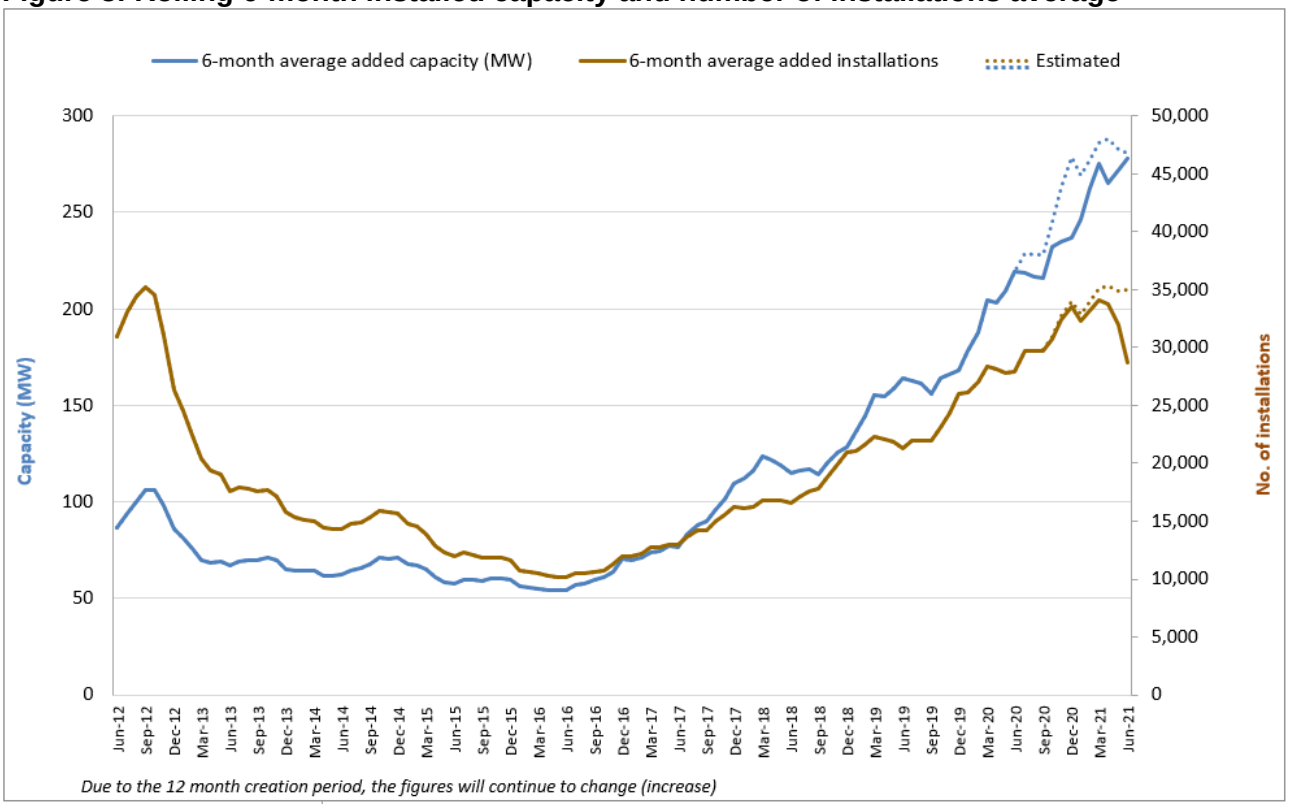
Figure 2: Quarterly rooftop PV installed capacity by states (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021
Note: The most recent three months in figure 3 underestimates the data because of a time lag in collation of the data.[1]

[1] Solar PV system owners have up to 12 months to report their data to the Clean Energy Regulator.,

Figure 3: Rolling 6-month installed capacity and number of installations average



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

The rolling six-month installation average in April 2021 (estimated to be 35,535 installations) overtook the previous peak in September 2012 when 35,239 system installations were recorded. The rolling average installed capacity (blue line) has steadily grown to reach an estimated six-month average of more than 280 MW on rooftops as of June 2021. This is 60MW higher than the six-month average in June 2020 (219 MW).

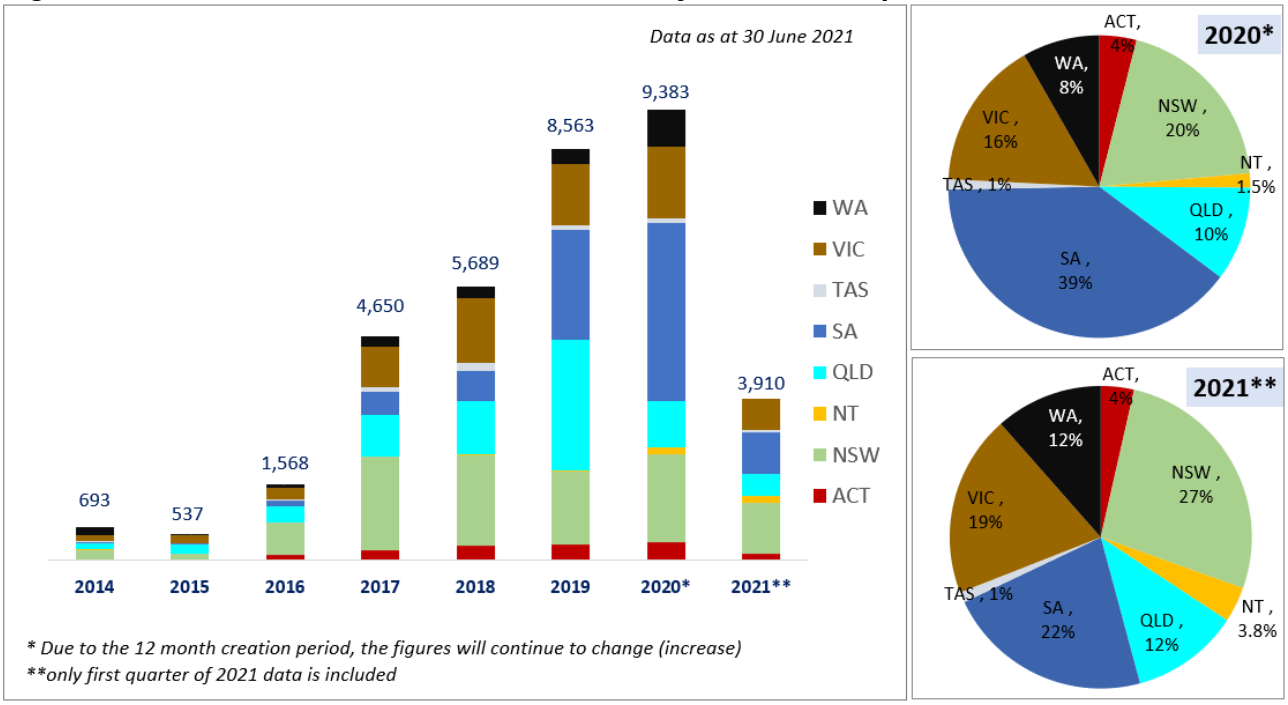
Battery installations with rooftop solar

In the first half of 2021, South Australia experienced a slowdown in new battery installations with rooftop PV. The state accounts for 22 per cent of the nation's total number of solar with battery installations (down from 39 per cent in 2020). This decrease is likely to be the result, in part, of the reduction of grants offered under the state's Home Battery Scheme introduced from 15 September 2020 (down from $6,000 to $3,000 for a home solar battery).

New South Wales shows an opposite trend with a strong upsurge in solar with battery installations, as more consumers seek greater control over their energy generation and consumption. The share of new installations with batteries jumped from 20 per cent to 27 per cent in the first half of 2021. It is expected that the state government's interest free-loan scheme for the installation of residential solar with battery storage has helped spur this increase in uptake.

Data from the first half of this year shows that Western Australia's battery storage with solar installations is 77 per cent higher (450 installations) than the same corresponding period in 2020 (254 installations). The state's share of battery with solar installations reached 12 per cent in the first six months of 2021.

Figure 4: Number of solar with concurrent battery installations per state since 2014



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

SECTION II: AUSTRALIAN TOP SOLAR INSTALLATION POSTCODES

While the 2020/21 financial year was difficult for most industries due to the impact of COVID-19, data shows Australia's rooftop solar PV industry was not adversely affected. All states, except for Northern Territory, hit records for the number of solar panels installed when compared to the previous financial year.

During the 2020/21 financial year, around 373,000 installations were added to the grid (up from 323,500 during in the 2019/20). Installed capacity also jumped from 2,500 MW to more than 3,000 MW.

Continued low technology costs, increased work from home arrangements, and a shift in household spending to home improvements during the COVID-19 pandemic played a key role in the increase of rooftop solar PV systems under the Small-scale Renewable Energy Scheme.

Solar uptake by state

Table 1 shows New South Wales led the way with more than 116,000 solar rooftop PV systems installed and 965 MW of capacity added to household rooftops. This represented 31.2 per cent and 32 per cent of Australia's total installations and installed capacity, respectively.

Queensland, Victoria, and Western Australia also saw strong uptake, with a total of 212,000 installations and a capacity of 1,670MW. This accounted for around 56.9 per cent and 50.4 per cent of Australia's total installations and installed capacity during the 2020/21 financial year.

Table 1: Total rooftop solar PV installations in the last two financial years (highest to lowest)

Number of rooftop solar PV installations	FY2020	FY2021*
NSW	92,847	116,368
QLD	79,431	89,349
VIC	66,877	73,010
WA	41,293	49,760
SA	31,531	33,079
ACT	4,387	5,919
TAS	3,359	3,365
NT	3,780	1,928

***** A 12 month creation period for STCs applies under the Renewable Energy (Electricity) Act 2000, so the figures will continue to rise throughout this year. Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

Top ranking postcodes

It is not surprising the nation's top postcodes for solar installations are also located in states with the highest number of rooftop PV uptake (figure 5).

Victoria and Western Australia are the only states with postcodes remaining in the top 10 across both financial years, showing the greatest growth in solar PV installation numbers (figure 6).

Figure 5: Number of installations and installed capacity by the top 10 suburbs in the last two financial years

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

Victoria recorded five of the top 10 postcodes during the 2020 financial year, with four suburbs continuing to rank in the top 10 during 2021. Postcodes 3029 (Hoppers Crossing, Tarneit, Truganina) and 3064 (Donnybrook) have held the top ranks for the past two years, these suburbs had an equivalent number of solar systems installed with a similar capacity of approximately 18.9 MW.

Queensland claimed four spots during 2020. However during 2021, 4300 is the only postcode in the top 10 list, ranking third with nearly 2,400 systems installed and 18.1 MW connected to the grid.

New South Wales did not make the top 10 list in 2020, but cracked the nation's top five with two postcodes during the 2021 financial year. While Victoria's greatest growth for rooftop PV systems

occurred around metropolitan areas, the biggest growth for New South Wales solar installations was north west of Sydney.

Western Australia postcodes replaced Queensland areas in 9th and 10th spots during 2021. The state **now** has three postcodes in the top 10, each with installation and installed capacity close to 1,800 units and 12 MW.

Figure 6: Top 10 postcodes in Australia with highest number of installations in the last two financial years

Rank FY20	State	Postcode	Number of installations	Total installed capacity (MW)
1st	VIC	3029	2,646	19.51
2nd	VIC	3064	2,118	14.47
3rd	VIC	3977	2,068	13.52
4th	VIC	3030	1,752	12.33
5th	QLD	4670	1,653	12.61
6th	QLD	4655	1,555	11.72
7th	WA	6112	1,552	10.01
8th	VIC	3978	1,531	9.81
9th	QLD	4551	1,522	10.61
10th	QLD	4209	1,453	10.99

Rank FY21	State	Postcode	Number of installations	Total installed capacity (MW)
1st	VIC	3064	2,627	18.90
2nd	VIC	3029	2,611	18.94
3rd	QLD	4300	2,378	18.11
4th	NSW	2765	2,154	17.79
5th	NSW	2155	1,997	16.72
6th	VIC	3977	1,986	14.17
7th	WA	6210	1,873	12.07
8th	VIC	3030	1,831	13.07
9th	WA	6112	1,818	12.08
10th	WA	6065	1,793	12.17

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 29 July 2021

South Australia did not rank in the nation's top 10 in FY2021. The leading postcode for the state was 5108 – which ranked 93rd overall - with a total of 738 systems and 5.5 MW of capacity.

Smaller populations in the ACT, Northern Territory and Tasmania is the obvious factor in their lower uptake compared to other jurisdictions. The 2021 Census data, to be released next year, will allow for further analysis of per capita solar penetration levels by postcodes.

SECTION III: LEVELISED COST OF ENERGY

The Levelised Cost of Energy (LCOE) is the cost of energy per kilowatt hour (kWh) produced. When this is equal to or below the cost consumers pay directly to suppliers for electricity, this is called grid parity. Table 1 shows the LCOE for solar in Australia's major cities, indicative retail prices and current Feed-in tariff (FiT) rates. The detailed methodology can be found in the Appendix.

The retail comparison rates are representative variable rates and do not include supply charges. For all capital cities, excluding Perth and Hobart, retail prices are based on the implied usage charges from St Vincent de Paul's tracking of market offers, which was last updated in July 2020. Perth prices are regulated and obtained from Synergy. Hobart prices were obtained from Aurora Energy's Tariff 31, while Darwin prices are obtained from Jacana Energy's regulated residential usage charges. Tables 1, 2 and 3 show the LCOE across major cities at different discount rates.

Table 2: Central estimate: 5.37 per cent discount rate (ten-year average mortgage rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.33	$0.15
Brisbane	$0.12	$0.11	$0.10	$0.09	$0.10	$0.10	$0.22	$0.15
Canberra	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.22	$0.11
Darwin	$0.15	$0.14	$0.13	$0.13	$0.12	$0.11	$0.26	$0.24
Hobart	$0.16	$0.15	$0.13	$0.13	$0.12	$0.13	$0.27	$0.09
Melbourne	$0.13	$0.12	$0.11	$0.11	$0.11	$0.11	$0.23	$0.15
Sydney	$0.12	$0.11	$0.10	$0.10	$0.10	$0.09	$0.27	$0.15
Perth	$0.09	$0.09	$0.08	$0.08	$0.08	$0.09	$0.29	$0.07

Source: Australian Energy Council analysis, August 2021

Table 3: Low cost of capital sensitivity: 3.45 per cent discount rate (low current standard variable rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.10	$0.10	$0.09	$0.08	$0.09	$0.09	$0.33	$0.15
Brisbane	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.22	$0.15
Canberra	$0.10	$0.09	$0.09	$0.08	$0.08	$0.08	$0.22	$0.11
Darwin	$0.13	$0.13	$0.12	$0.12	$0.11	$0.11	$0.26	$0.24
Hobart	$0.15	$0.13	$0.12	$0.12	$0.11	$0.12	$0.27	$0.09
Melbourne	$0.12	$0.11	$0.11	$0.10	$0.10	$0.10	$0.23	$0.15
Sydney	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.27	$0.15
Perth	$0.09	$0.08	$0.08	$0.07	$0.08	$0.08	$0.29	$0.07

Source: Australian Energy Council analysis, August 2021

Table 4: High cost of capital sensitivity: 10.17 per cent discount rate (indicative personal loan rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.14	$0.13	$0.11	$0.11	$0.11	$0.11	$0.33	$0.15
Brisbane	$0.15	$0.13	$0.12	$0.11	$0.12	$0.11	$0.22	$0.15
Canberra	$0.13	$0.12	$0.11	$0.11	$0.10	$0.10	$0.22	$0.11
Darwin	$0.18	$0.18	$0.16	$0.16	$0.15	$0.14	$0.26	$0.24
Hobart	$0.20	$0.18	$0.16	$0.16	$0.15	$0.15	$0.27	$0.09
Melbourne	$0.16	$0.15	$0.14	$0.13	$0.13	$0.13	$0.23	$0.15
Sydney	$0.14	$0.13	$0.12	$0.11	$0.11	$0.11	$0.27	$0.15
Perth	$0.11	$0.10	$0.10	$0.09	$0.10	$0.10	$0.29	$0.07

Source: Australian Energy Council analysis, August 2021

Small and Large business - Levelised Cost of Electricity

Tables 5 and 6 show the estimated cost of electricity production for commercial-sized solar systems. As businesses look to reduce overhead costs, installation of larger-scale solar systems continues to increase.

Business tariffs differ to residential retail tariffs. Depending on the size of the customer and the amount of energy used, businesses have the ability to negotiate lower prices. If a business was to consume all electricity onsite, the electricity prices in Tables 4 and 5 would represent the cost per kWh of consumption from the energy generated from the different system sizes listed. For businesses, installation occurs if the benefits of installation outweigh the cost. The average electricity bill for industrial businesses in 2014-15 was 10.72 c/kWh[iii].

Table 5: Central estimate: 4.98 per cent discount rate, ten-year average small business interest rate

All figures in $/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.11	$0.10	$0.10	$0.10	$0.10
Brisbane	$0.11	$0.10	$0.10	$0.10	$0.10
Canberra	$0.10	$0.10	$0.10	$0.10	$0.10
Hobart	$0.14	$0.13	$0.13	$0.12	$0.11
Melbourne	$0.13	$0.12	$0.12	$0.12	$0.11
Sydney	$0.12	$0.11	$0.11	$0.11	$0.10
Perth	$0.11	$0.10	$0.11	$0.10	$0.09

Source: Australian Energy Council analysis, August 2021

Table 6: Central estimate: 4.78 per cent discount rate, ten-year average large business interest rate

All figures in $/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.10	$0.10	$0.10	$0.10	$0.10
Brisbane	$0.11	$0.10	$0.10	$0.10	$0.09
Canberra	$0.10	$0.10	$0.10	$0.10	$0.10
Hobart	$0.14	$0.12	$0.13	$0.12	$0.11
Melbourne	$0.13	$0.12	$0.12	$0.11	$0.11
Sydney	$0.12	$0.10	$0.11	$0.11	$0.10
Perth	$0.11	$0.10	$0.11	$0.10	$0.09

Source: Australian Energy Council analysis, August 2021

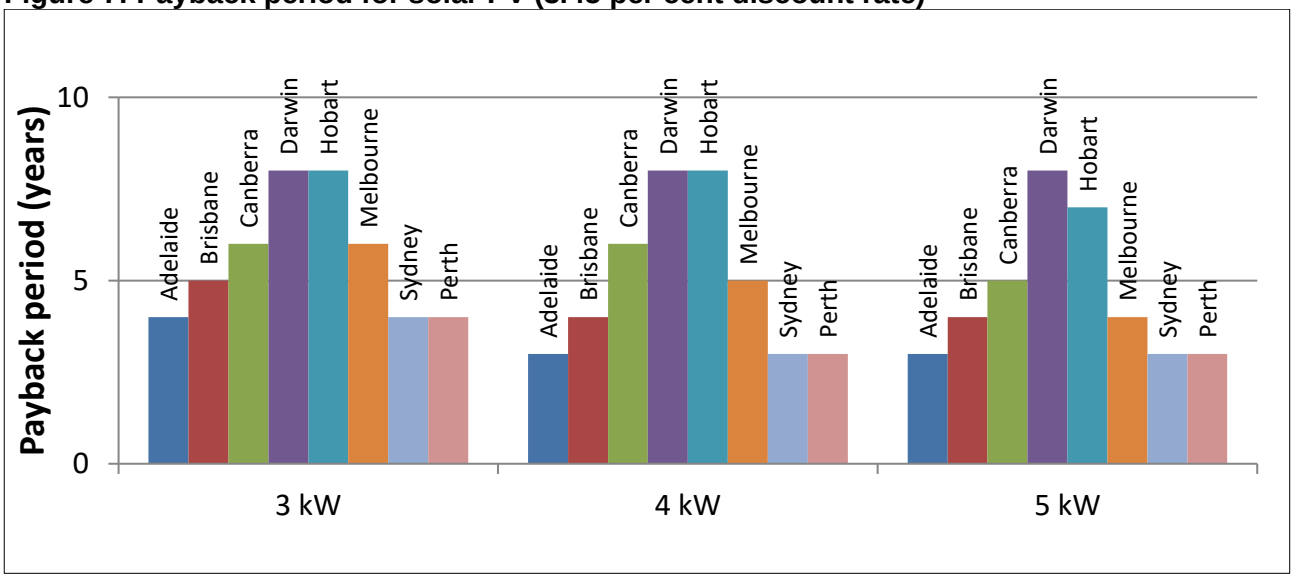
SECTION IV: PAYBACK PERIOD, DETAILED MODEL

The payback period is defined as the year when the cumulative savings are greater than the cumulative costs of a solar PV system. Savings represent the avoided cost of consumption and any revenue received from FiTs. The cumulative cost incurred represents the initial investment and the time value of money. A detailed methodology is contained in Appendix 2.

Figure 7 highlights the payback period for different system sizes across Australia. Note that electricity prices are subject to change with consumer price index (CPI) levels and therefore will affect the payback period. Many retailers offer higher solar FiTs, which help to offset the impact of higher prices in some states and deliver savings to customers with solar panels. The low payback periods across many cities further highlights the greater encouragement for customers to install solar PV.

The cost of solar PV to end users has been increased in all cities, except Canberra, Darwin and Hobart. This is due to a disruption of polysilicon supply out of China, coupled with a strong demand of solar installations in the big cities as analysed in our Section I[iv].

Figure 7: Payback period for solar PV (3.45 per cent discount rate)

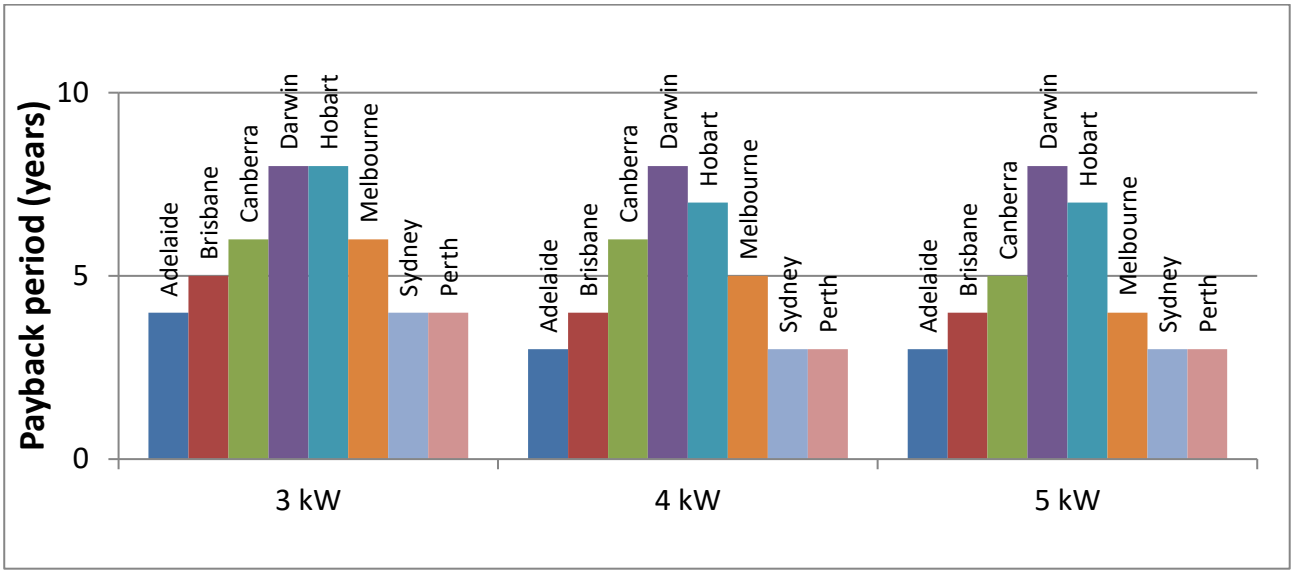


Source: Australian Energy Council analysis, August 2021

Comparing to the previous quarter, Darwin and Hobart have the highest cost of installations, resulting in the highest payback period of 7 years with a 3kW, 4kW and 5kW system.

Similarly, figure 8 shows the expected payback period for systems with a 5.37 per cent discount rate (10-year average home loan rate).

Figure 8: Payback period for solar PV (5.37 per cent discount rate)



Source: Australian Energy Council analysis, August 2021

SECTION V: METHODOLOGY APPENDIX

1. Solar installations methodology

Analysis from the CER's monthly data allows us to estimate the amount of solar PV installed in Australia. Since November 2015, the CER has consistently released data dated as at the first of each month. The new consistent release date allows us to provide a more accurate estimate of the capacity of recent installations. Due to the lag in reporting of new installations, however, the CER data takes up to 12 months to be finalised.

2. Payback period methodology

This methodology outlines our approach in calculating the payback period for solar panels installed across capital cities in Australia. Our analysis includes the following:

- Initial investment
- Discount rate
- Efficiency
- System degradation rate
- Export rate
- Avoided usage cost
- FiT

Initial investment, discount rate, efficiency and system degradation rate are described in Appendix 1. Key difference to LCOE calculation is the payback period assumes no annual maintenance cost.

Calculation

Payback period occurs when $\sum$ savings > $\sum$ cost

Where:

Savings = (usage cost x $(1+ CPI)^t$ x consumption / 100) + (Export x FiT)

Cost = investment x $(1 + \text{real discount rate})^t$

t = years

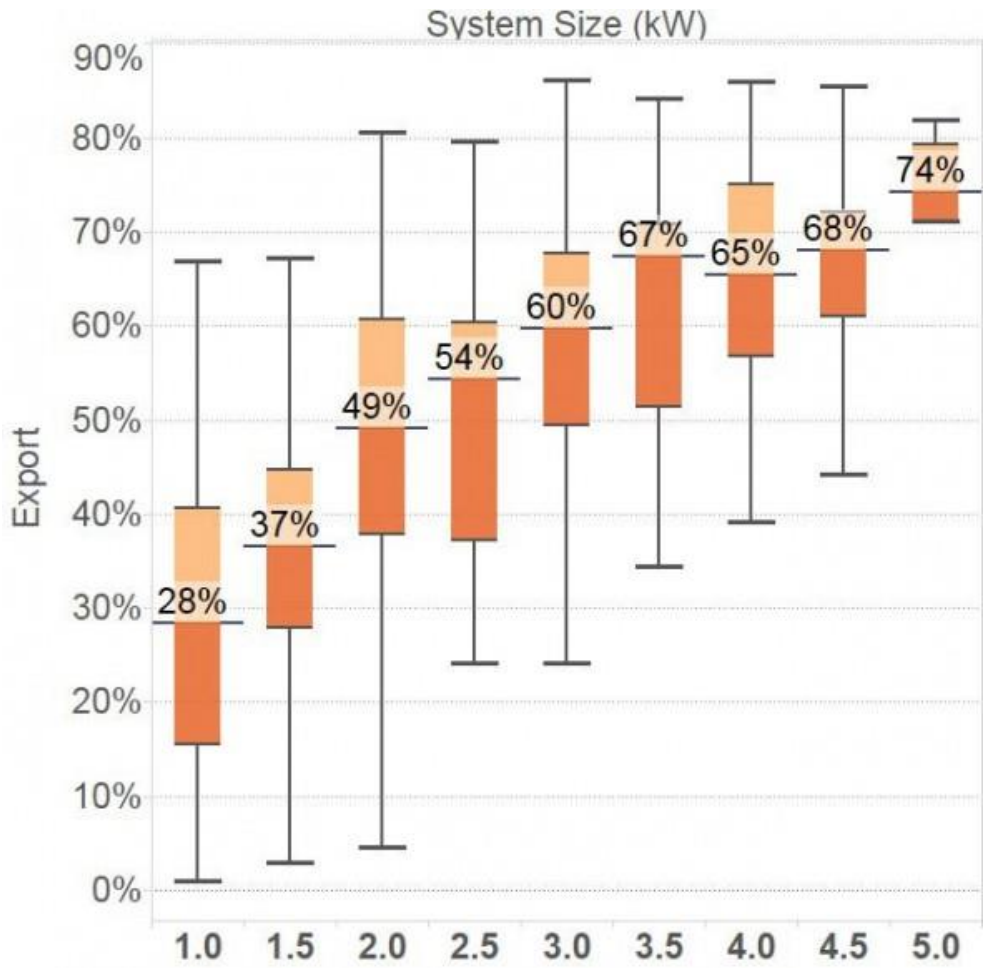
Avoided cost and FiT

The onsite consumption is multiplied by the retailer's usage charges. CPI has been applied to the usage charge to allow for growth in retail prices. The excess energy is exported to the grid and the customer is expected to receive the mandatory FiT or a realistic market offer where mandatory tariffs are not applicable.

Export rate

The percentage of onsite consumption and electricity which is exported to the grid is calculated using the median value from Sunwiz's analysis[v]. See figure 11 below.

Figure 8: Export rate of residential solar PV at different system sizes



Source: Sunwiz analysis, 2015

[i] The most recent three months underestimates the data because of a time lag in collation of the data. The data represents all systems that have had certificates created against them. There is a 12-month period to create the certificates, so numbers of installations are expected to continue to rise.
[ii] NSW, ACT, Qld, Vic, SA and Tasmania
[iii] BCA, "Impact of Green Energy Policies on Electricity Prices", June 2014
iv https://www.energycouncil.com.au/analysis/solar-supply-chain-costs-a-passing-cloud/
[v] Sunwiz, Solar Pays Its Way on Networks. Last accessed 17 June 2015.